Listing of Claims

1. (Currently Amended) A method of protecting an exposed copper surface of a partially fabricated IC from oxidation during exposure to an oxygen-containing environment, the method comprising:

contacting the exposed copper surface with a metallocene compound; and contacting the exposed copper surface with the oxygen-containing environment, whereby exposure to the metallocene compound minimizes formation of copper oxide on the exposed copper surface; wherein the metallocene compound contains a metal bound to one or more cyclopentadienyl ligands.

- 2. (Currently Amended) The method of claim 1, wherein the metallocene contains a metal selected from the group consisting of ruthenium, cobalt, nickel, iron, palladium, platinum, titanium, chromium, osmium, and manganese, and cobalt.
- 3. (Original) The method of claim 1, wherein the metallocene is ruthenocene.
- 4. (Original) The method of claim 1, wherein contacting the exposed copper surface with a metallocene compound comprises flowing a gas containing metallocene over the partially fabricated IC.
- 5. (Original) The method of claim 1, wherein contacting the exposed copper surface with the oxygen-containing environment comprises contacting the exposed copper surface with a compound that forms a solid phase layer on the partially fabricated IC.
- 6. (Previously Presented) The method of claim 5, wherein the compound is a precursor compound that reacts with an oxygen-containing species to form the solid phase layer.
- 7. (Previously Presented) The method of claim 1, wherein contacting the exposed copper surface with the oxygen-containing environment comprises contacting the exposed copper surface with a diffusion barrier precursor, which reacts with an oxygen-containing species to form a barrier layer on the partially fabricated IC.
- 8. (Previously Presented) The method of claim 7, wherein the oxygen-containing species is molecular oxygen.
- 9. (Previously Presented) The method of claim 1, wherein contacting the exposed copper surface with the oxygen-containing environment comprises contacting the exposed copper

surface with an etch stop precursor, which reacts with an oxygen-containing species to form an etch stop layer on the partially fabricated IC.

- 10. (Previously Presented) The method of claim 1, wherein contacting the exposed copper surface with the oxygen-containing environment comprises contacting the exposed copper with the ambient or other oxygen-containing environment during storage or transport between processing modules.
- 11. (Previously Presented) The method of claim 1, wherein the exposed copper surface comprises a copper seed layer on the partially fabricated IC.
- 12. (Currently Amended) A method of passivating and using an exposed copper surface of a partially fabricated IC, the method comprising:

contacting the exposed copper surface with a metallocene compound to thereby passivate the surface; wherein the metallocene compound contains a metal bound to one or more cyclopentadienyl ligands; and

depositing a layer of material on the <u>exposed copper surface</u> partially fabricated IC using an oxygen-containing deposition chemistry.

- 13. (Previously Presented) The method of claim 12 further comprising performing the contacting and depositing step in a single chamber.
- 14. (Previously Presented) The method of claim 12 wherein the depositing is conducted using the metallocene compound as a chemical precursor to the material.
- 15. (Previously Presented) The method of claim 12 wherein the contacting and depositing operations are done concurrently.
- 16. (Currently Amended) The method of claim 12, wherein the metallocene is contains a metal selected from the group consisting of ruthenium, cobalt, nickel, iron, palladium, platinum, titanium, chromium, osmium, and manganese, and cobalt.
- 17. (Previously Presented) The method of claim 12, wherein the metallocene is ruthenocene.
- 18. (Currently Amended) The method of claim 11, wherein contacting the exposed copper surface with a metallocene compound comprises flowing a gas containing metallocene over the partially fabricated IC.

- 19. (Previously Presented) The method of claim 12, wherein the depositing of a layer of material comprises contacting the exposed copper surface with a compound that forms a solid phase layer on the partially fabricated IC.
- 20. (Previously Presented) The method of claim 12, wherein the depositing of a layer of material comprises contacting the exposed copper surface with a diffusion barrier precursor, which reacts with an oxygen-containing species to form a barrier layer on the partially fabricated IC.
- 21. (Previously Presented) The method of claim 20, wherein the oxygen-containing species is molecular oxygen.
- 22. (Previously Presented) The method of claim 12, wherein depositing a layer of material comprises contacting the exposed copper surface with an etch stop precursor, which reacts with an oxygen-containing species to form an etch stop layer on the partially fabricated IC.
- 23. (Previously Presented) The method of claim 12, wherein the exposed copper surface comprises a copper seed layer on the partially fabricated IC.